FOCUS ON CATALYSTS

A MONTHLY REPORT FROM
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AN ALTERNATIVE YEAR

This is the month when I try to encapsulate an entire year's catalytic efforts in one phrase, one brief editorial. This year, without doubt, the main thrust in catalysis, if not in industrial chemistry generally, has been to find affordable alternatives to petroleum without wrecking national economies or the environment. Making alcohol from sugar was the easiest option, but was soon deemed unacceptable except in Brazil – where it is a pillar of the national economy. We need to make fuels from plant crops (including algae) which have no other present uses, without causing secondary problems (such as water shortages). The general problem is unsolved: this is merely a progress report.

The fundamental problem is how to capture the energy of sunlight, store it, and then convert it into a transportable form. The photochemical splitting of water is one approach: it has been demonstrated in the laboratory but is remote from utilisation. Other photochemical processes to make other fuels remain a challenge to the inventive. Meanwhile, we must continue to use photosynthesis and to employ farmers.

Biodiesel, made from a variety of animal and vegetable oils, has had some commercial success, but there have been technical problems with the products and the industry is coping with these by developing chemical additives[1].

Many plants, and plant-derived products, are being considered, including:

- Vegetable oils
- Animal oils
- Bagasse (sugarcane residue)
- Jatropha
- Miscanthus (a tall grass)
- Short rotation willow coppice
- Seaweeds
- Unicellular algae
- Wood – either waste or quick-growing
- Black liquor from papermaking
- Other plant biomass
- Municipal wastes

Examples of work on many of these energy sources can be found in this year's portfolio of catalytic projects – because they all need catalysts.

The UK work in this area is being coordinated by the Supergen-Bioenergy initiative of the EPSRC which has many industrial and academic partners and has funding until 2011. Progress is reported in British Bio-energy News[2]. In the USA, the Department of Agriculture and the Department of Energy launched a National Biofuels Action Plan on 7 Oct 2008.

Bioenergy is at an exciting stage of development and is starting to be the subject of new books (some are listed below), journals, conferences, and government initiatives. And a nearly new word – torrefaction, aka torrification (Google will explain).

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1) Chemistry and Industry, 27 Oct 2007, (20), 23
2) British Bio-energy News (Website: http://www.supergen-bioenergy.net), editor Rob Fenton, email: r.b.fenton@aston.ac.uk